TEACHING PLAN: Biodiversity (Archegoniate) (Dr. Santosh Joshi)

SCHOOL: (SOBAS) SCHOOL OF BASIC & APPLIED SCIENCES			**ACADEMIC SESSION: 2024**		**FOR STUDENTS' BATCH: B.Sc. Bio Semester II**
1	**Course code**	**BOT-102**			
2	**Course Title**	**Biodiversity (Archegoniate)**			
3	**Credits**	**3**			
4	**Learning Hours**		**Contact Hours**	**38**	
			Practical Teaching	**30**	
			Project, Tutorial and Assessment	**22**	
			Total hours	**90**	
5	**Course Objective**	1. The major objective of this course is to provide a general characteristic of bryophytes and pteridophytes. 2. To know about the life cycle/alternation of generation of bryophytes and pteridophytes. 3. To understand the evolution of different classification systems in bryophytes and pteridophytes. 4. To get an insight of evolution of higher plants from lower ones (Thallophytes). 5. To get an information on diagnostic features and economic importance of some bryophytes and pteridophytes. 6. To understand the evolution of vascular/stellar system.			
6	**Course Outcomes**	After completing the course, the students will be able to: 1. Recognize, and describe the morphological characteristics of bryophytes and pteridophytes. 2. Draw and describe the gametophytic and sporophytic life cycle of bryophytes and pteridophytes. 3. Identify the given specimens in laboratory and field-based study. 4. Understand the origin and evolution of Land plants. 5. Understand the affinities of thallophytes with higher plants. 6. Evaluate the importance of Archegoniates.			
7	**Outline syllabus:**				
7.01	**Paper Code**	**Unit**	**Introduction**	**Reference number**	**Teaching methods**
7.02	**Paper Code. Unit I BOT-102**	(a)	General characters, alternation of generations, Origin and evolution of Bryophytes classification (upto classes).	[2]A text book of botany & [4]A text book of botany	Power point presentation & Group Discussion
		(b)	Structure and reproduction of *Marchantia*, *Anthoceros* and *Funaria*.	[2]A text book of botany & [4]A text book of botany	Power point presentation & Video
7.03	**Paper Code. Unit II**	(a)	General characters and economic importance of Pteridophyta.	[1]Pteridophytes &	Diagrams, Group Discussion &

	BOT-102			[4]A text book of botany	Power point presentation
		(b)	Classification (upto classes), alternation of generations of Pteridophyta.	[2]A text book of botany & [4]A text book of botany	Power point presentation.
		(c)	General characters and Classification of Gymnosperms.	[2]A Text Book of Botany	Group Discussion & Power point presentation
		(a)	Structure and reproduction (excluding development) of *Rhynia.*	[1]Pteridophytes & [4]A text book of botany	Diagrams & Power point presentation
7.04	**Paper Code. Unit III BOT-102**	(b)	Structure and reproduction (excluding development) of *Selaginella.*	[1]Pteridophytes & [4]A text book of botany	Power point presentation, Group Discussion & Video
		(c)	Structure and reproduction (excluding development) of *Equisetum, Pteris.*	[2]A Text Book of Botany	Group Discussion & Power point presentation
		(a)	Morphology and anatomy of roo stem, leaf/leaflet and reproductive parts including reproduction of *Cycas*, and Life cycle of *Cycas*.	[2]A Text Book of Botany	Power point presentation & Discussion
		(b)	Morphology and anatomy of root, stem, leaf/leaflet and reproductive parts including mode of reproduction, and life cycle of *Pinus*.	[2]A Text Book of Botany	Diagrams & Power point presentation
7.05	**Paper Code. Unit IV BOT-102**	(c)	Morphology and anatomy of root, stem, leaf/leaflet and reproductive parts including mode of reproduction, and life cycle of *Ephedra*.	[2]A Text Book of Botany and [1]College Botany Volume II	Power point presentation & Discussion
		(d)	Economic Importance of various orders of Gymnosperms.	[2]A Text Book of Botany and [1]College Botany Volume II	Power point presentation
8	**Course Evaluation**				
8.10	**CA: 20%**				
8.1	**Attendance**	5%			
8.12	**Homework**	-			

8.13	**Quizzes**	4 Quizzes, 5%
8.14	**Projects**	1 Project, 5%
8.15	**Presentation**	1 Presentation, 5%
8.16	**Any other**	--
8.2	**MTE(IA)**	20%
8.3	**End-term examination: 60%**	
9	**Text Books & References**	
9.1	**Text books**	1. Sharma. O.P. Pteridophytes. 2000. Total and tomorrow Publications. 2. College Botany Volume II, by Dr. B. P. Pandey, S. Chand Publisher. 3. Surbhai. R.C. and Saxena. R.C. 1990. A text book of Botany. Rastogi & Co., Meerut. 3. Sporne. K. R. 2002. The Morphology of Gymnosperms. B.I. pub. Pvt. Ltd., Mumbai, Kolkata. 4. Singh, V.P. Pandey, P.C. & Jain, D.K. 2013. A text book of botany (IV Ed). Rastogi.
9.2	**References**	1. Whilson, N.S. and rothewall. G.W. 1993. Paleobotany and evalution of plants. (II Ed.). Cambridge university press. U.K. 2. Gilford. L.M. and Foster. A.S. 1998. Morphology and evalution of vascular plants. W.H. Preeman and Compony. New York.
	Online Chapters/ Articles	1. https://www.sciencedirect.com/science/article/pii/S2667031322000410# 2. https://www.sciencedirect.com/science/article/pii/B978012373972800005X 3. https://www.sciencedirect.com/science/article/pii/B9780444427557500225 4. https://www.sciencedirect.com/science/article/pii/B9780080219486500467 5. https://www.sciencedirect.com/science/article/abs/pii/S0378874117302891 6. https://www.sciencedirect.com/science/article/pii/B9780444427557500237 7. https://www.sciencedirect.com/science/article/abs/pii/S0367253021001900 8. https://www.sciencedirect.com/science/article/pii/B9780081029084000680 9. https://www.sciencedirect.com/science/article/abs/pii/S1055790320300580 10. https://www.sciencedirect.com/science/article/abs/pii/S1055790314000566 11. https://www.sciencedirect.com/science/article/pii/B0123693969000198

9.3	**Video References**	1. https://www.youtube.com/watch?v=V8zGtuX-8ZI 2. https://www.youtube.com/watch?v=NhGxbS9osjs 3. General Characteristics of Gymnosperms (in english)| For B.Sc. and M.Sc.| GYMNOSPERM LECTURE NO- 01 - YouTube 4. Cycas - Reproduction - YouTube

Mapping of Outcomes v. Topics

Outcome no. → Syllabus topic↓	**1**	**2**	**3**	**4**	**5**	**6**
Paper Code. Unit I (a)	√	√	√	√	√	√
Paper Code. Unit I (b)	√	√	√	√	√	√
Paper Code. Unit II (a)	√	√	√	√		√
Paper Code. Unit II (b)	√	√	√	√		√
Paper Code. Unit II (c)	√	√	√	√		√
Paper Code. Unit III (a)	√	√	√	√	√	√
Paper Code. Unit III (b)	√	√	√	√	√	√
Paper Code. Unit III (c)	√	√	√	√		√
Paper Code. Unit IV (a)	√	√	√	√		√
Paper Code. Unit IV(b)	√	√	√	√		√
Paper Code. Unit IV(c)	√	√	√	√		√
Paper Code. Unit IV(d)	√	√	√	√		√

QUESTION BANK

UNIT I

1. Give occurrence of bryophytes.
2. What type of sporophyte is found in Bryophytes?
3. How does vegetative reproduction occur bryophytes?
4. Describe alternation of generation in Bryophytes. Point out the differences between alternations of generations met within the algae and the bryophytes.
5. In what respect do bryophytes differ from algae, and resemble algae.
6. Give two similarities between bryophytes and pteridophytes.
7. Give two differences between bryophytes and pteridophytes,
8. What is homologous theory about evolution of bryophytes?
9. Give occurrence of *Anthoceros*. Name its different species.
10. How does growth occur in bryophytes?
11. What are Gemmae? Give their function.
12. What structure are produced by the division of endothelium and amphithecium?
13. What is Apospory? In which plant does it occur?
14. What are paraphylls?
15. What are tubers? Give their function.
16. How is fertilization occurred in *PoreIla*?
17. What is rhizome? Give its function.
18. Give structure of leaf of *Polytrichum*.

19. What is archegonial head?
20. What is Peristome? Give its function.
21. Write a short note on Bryophytes as amphibians of plant kingdom.
22. Draw the diagrammatic life cycle of *Marchantia*.
23. Describe the structure of Antheridium and Archegonium in *Marchantia*.
24. Explain the structure of sporophyte in *Anthoceros*.
25. Write a short note on Pseudo elaters.
26. Describe the structure of Antheridium and Archegonium in *Anthoceros*.
27. Write a short note on vegetative reproduction in *Marchantia, Anthoceros* and *Funaria* with well-labelled diagrams.
28. Give a brief account the spore formation and dehiscence of capsule in *Anthoceros.*
29. Give a brief account of the life cycle of *Funaria*.
30. Discuss morphological and internal features of *Marchantia, Anthoceros* and *Funaria*.
31. Discuss Apospory and Apogamy.
32. Describe the position, structure and function of tuberculate rhizoids in *Marchantia* thallus.
33. In what respect does *Funaria* differ from the liverworts.

UNIT II

1. Give occurrence of pteridophytes.
2. Differentiate between Microphyllous and Megaphyllous.
3. Differentiate between phyllosporous and stachyosporous Sporangia.
4. What is tapetum? Give its function.
5. Give alternation of generation in pteridophytes.
6. What is Protostele?
7. Differentiate between Haplostele and Actinostlele.
8. What is plectostele?
9. What is Dictyostele?
10. Differentiate between Protoxylem and Metaxylem?
11. What are Exarch, Mesarch and Endarch?
12. What is rhizome? Give its function.
13. How fertilization occur in Psiletum?
14. *Give* alternation of generation in Psilotum.
15. What are trabecullae?
16. What is octant? Which structure does it give rise?
17. What is circinate vernation?
18. Give the walls of spores of Adiantum.
19. How does fertilization occur in Adiantum?
20. Give occurrence and common species of Marsilea.
21. What is sporocarp?
22. Name a xerophytic pteridophyte.
23. Name three hydrophytic pteridophytes.
24. Name four homosporous pteridophytes.
25. Name four heterosporous pteridophytes.
26. Give classification of pteridophytes studied by you.
27. Write about the general characters of Gymnosperms.

28. Give occurrence of Gymnosperms.

29. Give two resemblances between gymnosperms and pteridophytes.

30. Give two similarities between gymnosperms and angiosperms.

31. What are coralloid roots? Give their advantage to plant.

32. Explain in brief about the origin and evolution of Gymnosperms.

33. Elaborate evolution of seed habit.

34. The first green plants and fungi appeared on land during which period?

35. Evolution of seed habit first started in which group of plants?

36. Name 10 genera of conifers which are found in Himalayas.

37. Describe the distribution of Gymnosperms in India.

38. Why all seed bearing plants- gymnosperms and angiosperms have not placed in a single group?

39. Briefly comment on the affinities of gymnosperms.

40. In what respects Gnetales are different from other gymnosperms?

41. Enumerate important diagnostic features of the various groups of gymnosperms.

42. Name at least two orders of gymnosperms which include only extinct members.

43. Members of which order are commonly known as seed ferns?

44. "Gymnosperms are a connecting link between angiosperms and pteridophytes." Comment.

45. What are the main divisions and representative species of gymnosperms?

46. How different are gymnosperms from bryophytes and pteridophytes?

47. Sahni classified gymnosperms into two subdivisions. What was the basis of his classification?

48. Give examples of Indian fossil plant in Gymnosperms.

49. In which class Ephedrales were included by Pant?

50. Give a brief outline of classification of gymnosperms given by Prof. D.D. Pant.

51. Write about the classification of Gymnosperms.

UNIT III

1. Give details of classification of Pteridophytes along with salient features of each group

2. Describe the morphology and internal structure of reproductive organs in *Rhynia*.

3. Describe the structure and reproduction in *Selaginella*.

4. Give a brief account of the life history of *Equisetum*.

5. Give a brief account of the Life cycle of *Pteris*.

6. Describe the sex structures of Selaginella and *Equisetum*.

7. Compare Psilopsida, Lycopsida, Sphenopsida and Pteropsida in detail.

8. Give two evolutionary significances of Selaginella.

9. Differentiate between fertile and sterile branches of *Equistem*.

10. Give internal structure of leaf of *Equisetum*?

11. Give process of fertilization in *Equisetum*.

UNIT IV

1. Write about the economic importance of Gymnosperms.

2. Write about the economic importance of *Ephedra*.

3. Mention the characters of *Cycas*.

4. Mention two Indian species of *Cycas*.

5. Is the female cone of *Cycas* is a true cone?

6. Mention two economic importance of Cycas.

7. How pollination takes place in Cycas?

8. Why Cycas is called a primitive gymnosperm?

9. Which plant is called living fossil? Why?

10. How does fertilization occur in *Cycas*?

11. Name two Indian species of *Pinus*.

12. How many types of branches are there in the *Pinus* tree?

13. Mention about the nature of dwarf shoots of *Pinus*.

14. Mention about the xerophytic characters of *Pinus* leaf.

15. What do you mean by shower of sulphur?

16. Explain about the structures composing a megasporophyll of *Pinus*.

17. Mention two economic importance of *Pinus*.

18. Compare the structure of *Cycas* and *Pinus*.

19. Describe with sketches the structure of female cone of *Pinus*.

20. Write about female gametophyte of *Ephedra* with the help of suitable diagram.

21. Explain about life cycle *Ephedra*.

22. Write about the reproduction of *Ephedra*.

23. Morphology and anatomy of root of *Ephedra*.

24. Write about male gametophyte of *Ephedra* with the help of suitable diagram.

25. Morphology and anatomy of stem of *Ephedra*.

26. Morphology and anatomy of leaf/leaflet of *Ephedra*.

PROJECTS (To be given to group of students)

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1. Early land plant adaptations to terrestrial stress.
2. Origin and Evolution of the Seed Habit.
3. Why Are Bryophytes So Rare in the Fossil Record?
4. Role of lower plants in the remediation of polluted systems.
5. Write about some Gymnosperms plants found around your area and mention their names.
6. Fossil plants of Gymnosperms.
7. Seed anatomy and development in cycads and Ginkgo: keys for understanding the evolution of seeds.